MGM21 Make Stands (v2_1) – User's Guide – December 16, 2021

Introduction

The MGM Make Stands workbook prepares tree data for MGM, identifies common data errors, and creates MGM Stand Worksheets. The MGM Make Stands User's Guide also includes detailed instructions and formatting rules to prepare tree data for MGM.

Using the MGM Make Stands Workbook

1. Download and install MGM on your computer using the links and installation instructions on the MGM website. Follow the instructions carefully and verify that MGM runs on your system. Please note the "working directory" where you installed MGM (e.g. "C:\Users\YourProfile\Desktop\MGM21").
2. Download "MGM21_Make_Stands_v2_1.xlsm". Note: Steps 2 through 3 assume that you received a copy of MGM Make Stands in an email or a download from the MGM website. Please ignore Steps 2 through 3 if you already have a copy of MGM21 Make Stands (v2_1).
3. In your download directory, right-click on "MGM21_Make_Stands_v2_1.xlsm", and select "Properties". In the new dialog (Figure 3.1), go to the "General" tab. If visible, check "Unblock" in the lower-right corner. Then, click "OK" (Figure 3.1). <u>MGM Make Stands will not run if "MGM21_Make_Stands_v2_1.xlsm" is "Blocked" by Windows.</u>
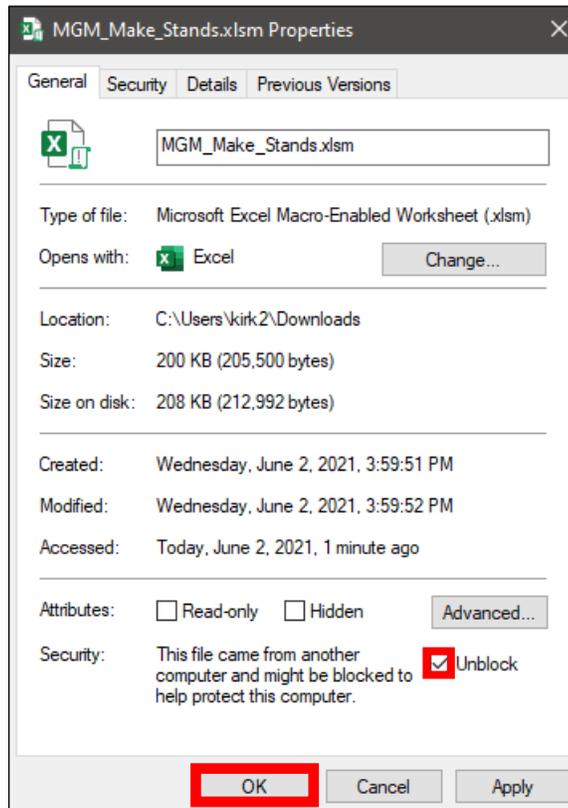

Figure 3.1. Unblock "MGM21_Make_Stands_v2_1.xlsm".

4. Cut and paste "MGM21_Make_Stands_v2_1.xlsm" from your download directory into your MGM working directory (e.g. "C:\Users\YourProfile\Desktop\MGM21").

5. Open "MGM21_Make_Stands_v2_1.xlsm". If security warning(s) appear, click "Enable Content" under the Excel Ribbon (Figure 5.1).
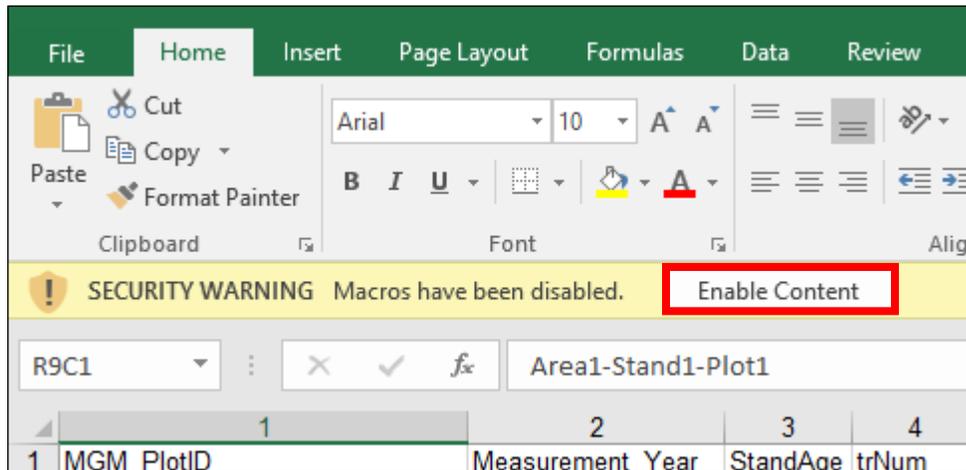

Figure 5.1. "Enable Content" under the Excel Ribbon.

6. Review the "Example_Data" worksheet. Make your treelist data match the formatting and column order in the "Example_Data" worksheet. (The first row in the "Example_Data" worksheet includes definitions and formatting tips.)
    a. Treelist data must include the following variables. Do not include dead trees. Column order is important.
        i. MGM_PlotID – Unique plot identifier.
            o May be character or numeric.
            o May not be blank or exceed 31 characters.
            o Dash or underscore delimited MGM_PlotID's are recommended (e.g. Area-Stand-Plot or Agency_Plot).
        ii. Measurement_Year – Measurement year (year). Must be numeric. May not be blank or contain spaces.
        iii. StandAge – Stand age (years) at a given Measurement_Year. Must be numeric. May not be blank or contain spaces.
        iv. trNum – Tree number. May be character or numeric. May not be blank. Unique tree numbers are recommended but not required.
        v. trSpp – Tree species code (Table 1).
            o Must be character and match the MGM Region (Table 1).
            o May not be blank or contain spaces.
            o Not case specific.
            o Uniform/capitalized species codes are recommended (e.g. Table 1).
        vi. trDbh – Tree diameter at breast height (cm @ 1.3m height).
            o Must be numeric. May not be blank or contain spaces.
            o Trees > 1.3m tall must have a trDbh value.
            o Trees ≤ 1.3m tall must include a "-1" placeholder in the trDbh column.
        vii. trPha – Tree per hectare value or "Tree Factor" for each tree (10,000 / plot area m²).
            o Must be numeric. May not be blank or contain spaces.
            o Trees that are sampled within nested subplots must have a different trPha value than "main plots" [e.g. Main plot = 400m²; trPha = (10,000 / 400m²) = 25. Subplot = 50m²; trPha = (10,000 / 50m²) = 200].
        viii. trHt – Tree height (m). Must be numeric. May not be blank or contain spaces.
        ix. trAge – Tree age.
            o Must be numeric. May not be blank or contain spaces.
            o In most situations, the trAge column should contain a "-1" placeholder to activate MGM's Age Solver. More details about MGM's Age Solver can be found on the MGM website.
            o If available, observed trAge values may be submitted to MGM if the trAge values were obtained through increment coring or direct measurements on the target tree.

- o Observed trAge values are uncommon, difficult to obtain, and are not required to run MGM.
        - o Assigning block age or AVI age to the trAge column **is not recommended**.
    x. trBHAge – Tree breast height age (age @ 1.3m height).
        - o Must be numeric. May not be blank or contain spaces.
        - o In most situations, the trBHAge column should contain a "-1" placeholder to activate MGM's Age Solver. More details about MGM's Age Solver can be found on the MGM website.
        - o If available, observed trBHAge values may be submitted to MGM if the trBHAge values were obtained through increment coring or direct measurements on the target tree.
        - o Observed trBHAge values are uncommon, difficult to obtain, and are not required to run MGM.
        - o Assigning an adjusted block age (e.g. block age - DefaultYearsToBreastHeight) or an adjusted AVI age (e.g. AVI age - DefaultYearsToBreastHeight) to the trBHAge column **is not recommended**.
    xi. trCratio – Tree crown ratio (unused). Column must contain a "-1" placeholder. May not contain spaces.
    xii. trCwidth – Tree crown width (generally unused). If unused, trCwidth must contain a "-1" placeholder. If defined, trCwidth must be numeric and may not contain spaces.
    xiii. x – Tree x coordinate (generally unused). Column may be blank. If defined, the tree "x" coordinate must be numeric and may not contain spaces.
    xiv. y – Tree y coordinate (generally unused). Column may be blank. If defined, the tree "y" coordinate must be numeric and may not contain spaces.
    xv. Region – Code that defines the MGM Regional Variant (Alberta, British Columbia, Saskatchewan, or Manitoba). May not be blank or contain spaces. The Region codes are defined in Table 2.
    xvi. Subregion – Code that defines the MGM Subregion. May not be blank or contain spaces. The Subregion codes are defined in Table 2. In Alberta and British Columbia, subregion may be defined using the plot location and a GIS layer or a subregion map.
    xvii. Sw_BH_SI – White spruce site index (m@50years BHAge).
        - o If white spruce, Engelmann spruce, hybrid spruce, balsam fir, subalpine fir, or Douglas-fir are present on a plot, Sw_BH_SI must be defined. Otherwise, Sw_BH_SI may be left blank or filled with a default Sw_BH_SI value.
        - o If defined, Sw_BH_SI must be numeric and may not contain spaces.
        - o Sw_BH_SI values under 5m or over 30m are not allowed in MGM.
    xviii. P_BH_SI – Pine site index (m@50years BHAge).
        - o If pine (i.e. lodgepole pine, jack pine, Ponderosa pine, limber pine, or whitebark pine) are present on a plot, P_BH_SI must be defined. Otherwise, P_BH_SI may be left blank or filled with a default P_BH_SI value.
        - o If defined, P_BH_SI must be numeric and may not contain spaces.
        - o P_BH_SI values under 5m or over 30m are not allowed in MGM.
        - o P_BH_SI must reflect either lodgepole pine or jack pine.
        - o As a coarse rule for Alberta, pine west of -114° longitude (i.e. DLS 5th Meridian) may be classified as lodgepole pine, and pine east of -114° longitude may be classified as jack pine.
    xix. Aw_BH_SI – Aspen site index (m@50years BHAge).
        - o If hardwood species (i.e. trembling aspen, balsam poplar, black cottonwood, white birch, bur oak, Manitoba maple, or white elm) are present on a plot, Aw_BH_SI must be defined. Otherwise, Aw_BH_SI may be left blank or filled with a default Aw_BH_SI value.
        - o If defined, Aw_BH_SI must be numeric and may not contain spaces.
        - o Aw_BH_SI values under 7m or over 30m are not allowed in MGM.
    xx. Sb_BH_SI – Black spruce site index (m@50years BHAge).
        - o If black spruce or tamarack are present on a plot, Sb_BH_SI must be defined. Otherwise, Sb_BH_SI may be blank or filled with a generic Sb_BH_SI value.
        - o If defined, Sb_BH_SI must be numeric and may not contain spaces.
        - o Sb_BH_SI values under 5m or over 30m are not allowed in MGM.
    xxi. CMI – Mean climate moisture index (CMI) from 1981 to 2010.
        - o Must be numeric. May not be blank or contain spaces.
        - o Must match the CMI value in the associated MGM Crop Plan.
        - o **CMI should be calculated using the MGM CMI Solver and ClimateNA (Wang et al. 2016) Version 6.11 data. Other versions of ClimateNA may not be used to calculate CMI.** Please

see the "MGM CMI Solver" section on the [MGM Download](#) page to get the MGM CMI Solver, ClimateNA Version 6.11, and instructions to calculate CMI.

b. Site Index Notes
   i. MGM requires breast height age site index values (m@50years BHAge).
   ii. Alberta users should enter breast height age site index values from the GYPSY site index curves (Huang et al. 2009). Alberta users **should not** enter total age site index values (m@50years total age) from the GYPSY site index curves (Huang et al. 2009).
   iii. Site index values that are defined in Make Stands and added to MGM Stand Worksheets take precedence over (i.e. replace) the Default Site Index values (Default_Sindex) in the MGM Crop Plan.
   iv. Site index values that are not defined in Make Stands or added to MGM Stand Worksheets assume the Default Site Index values (Default_Sindex) in the MGM Crop Plan.
   v. Default Site Index values can be defined using ecosite information and ecosite-based site index values.
      o In Northern Alberta, West-Central Alberta, and Saskatchewan, Default Site Index values for white spruce, pine, and trembling aspen can be defined using the information provided in MGM Research Note #2019-1 (Bjelanovic and Comeau 2019) or other local information. Default Site Index values for black spruce can be defined using the information provided in MGM Research Note #2020-1 (Comeau 2020) or other local information.
      o In Southwest Alberta, Default site index values for white spruce, pine, trembling aspen, and black spruce can be defined using the information provided in Archibald et al. (1996) or other local information.
      o In British Columbia and Manitoba, Default Site Index values for white spruce, pine, trembling aspen, and black spruce can be defined using the information provided in MGM Research Note #2020-1 (Comeau 2020) or other local information.

Table 1. Tree species codes by MGM. Regions: AB = Alberta, BC = British Columbia, SK = Saskatchewan, and MB = Manitoba; "-" = Not Applicable

Common Name	Latin Name	Region			
		AB	BC	SK	MB
Balsam Fir	*A. balsamea*	FB	BB	BF	BF
Balsam Poplar	*P. balsamifera ssp. balsamifera*	PB	ACB	BP	BA
Balsam Poplar/Black Cottonwood	*P. balsamifera*	PB	AC	BP	BA
Black Cottonwood	*P. balsamifera ssp. trichocarpa*	-	ACT	-	-
Black Spruce	*P. mariana*	SB	SB	BS	BS
Bur Oak	*Q. macrocarpa*	-	-	BO	BO
Douglas-fir (Coastal)	*P. menziesii*	-	FD	-	-
Douglas-fir (Interior)	*P. menziesii var glauca*	FD	FDI	-	-
Engelmann Spruce	*P. engelmannii*	SE	SE	-	-
Hybrid (Interior) Spruce	*Picea crosses/hybrids*	-	SX	-	-
Jack Pine	*P. banksiana*	PJ	PJ	JP	JP
Limber Pine	*P. flexilis*	PF	PF	-	-
Lodgepole Pine	*P. contorta*	PL	PL	LP	-
Manitoba Maple	*A. negundo*	-	-	MM	MM
Ponderosa Pine	*P. ponderosa*	-	PY	-	-
Subalpine Fir	*A. lasiocarpa*	FA	BG	-	-
Subalpine Larch	*L. lyallii*	LA	LA	-	-
Tamarack	*L. laricina*	LT	LT	TL	TL
Trembling Aspen	*P. tremuloides*	AW	AT	TA	TA
Western Larch	*L. occidentalis*	LW	LW	-	-
White Birch	*B. papyrifera*	BW	EP	WB	WB
White Elm	*U. americana*	-	-	WE	WE
White Spruce	*P. glauca*	SW	SW	WS	WS
Whitebark Pine	*P. albicaulis*	PW	PA	-	-

Table 2. MGM Region and Subregion codes. Regions: AB = Alberta, BC = British Columbia, SK = Saskatchewan, and MB = Manitoba; AB Subregions: (NRC 2006); BC Subregions: British Columbia Biogeoclimatic Ecosystem Classification (BEC; https://www.for.gov.bc.ca/hre/becweb/index.html).

Region	Region Code	Subregion	Subregion Code
AB	1	Central Mixedwood	1
		Dry Mixedwood	2
		Northern Mixedwood	3
		Boreal Subarctic	4
		Peace-Athabasca Delta	5
		Boreal Highlands (Lower & Upper)	6
		Alpine	7
		Sub-Alpine	8
		Montane	9
		Upper Foothills	10
		Lower Foothills	11
		Athabasca Plain	12
		Kazan Upland	13
		Foothills Parkland	14
		Peace River Parkland	15
		Central Parkland	16
BC	2	Boreal White and Black Spruce	1
		Sub-Boreal Spruce	2
SK	3	Province-wide	1
MB	4	Province-wide	1

7. Sort the treelist data by MGM_PlotID and trNum.
   a. The "Make Stands" macro requires treelist data sorted by PlotID and trNum. The "Make Stands" macro will create MGM Stand Worksheets for each plot in the "Input_Treelist" worksheet in the same order as the "Input_Treelist" worksheet.
   b. It is recommended that treelist data are sorted by MGM_PlotID and trNum during database export. Then, sorting in Excel (Step 7) is not necessary.
8. Paste your treelist data into the "Input_Treelist" worksheet.
   a. Clear or overwrite any pre-existing data in the "Input_Treelist" worksheet.
   b. As an alternative, you can import your data as a new Excel worksheet. Then, delete the pre-existing worksheet named "Input_Treelist", and rename your treelist data "Input_Treelist".
9. If you have already used the current copy of the MGM21 Make Stands (v2_1) Workbook, delete all pre-existing MGM Stand Worksheets in the MGM21 Make Stands (v2_1) Workbook. Deleting pre-existing MGM Stand Worksheets will prevent data duplication errors.
10. Select "View" on the Excel Ribbon. Then, select "Macros" and "View Macros" (Figure 10.1).
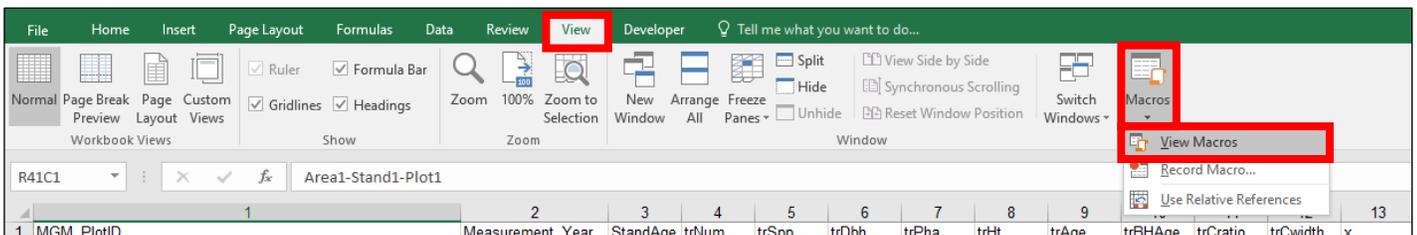

Figure 10.1. View Macros.

11. A "Macro" dialog will appear (Figure 11.1). Under "Macro name", run "Step1_Prep_Input_Treelist" (Figure 11.1). This macro copies your data into the "Prepared_Input_Treelist" worksheet, checks it for common errors, and prepares it for the Make Stands macro.
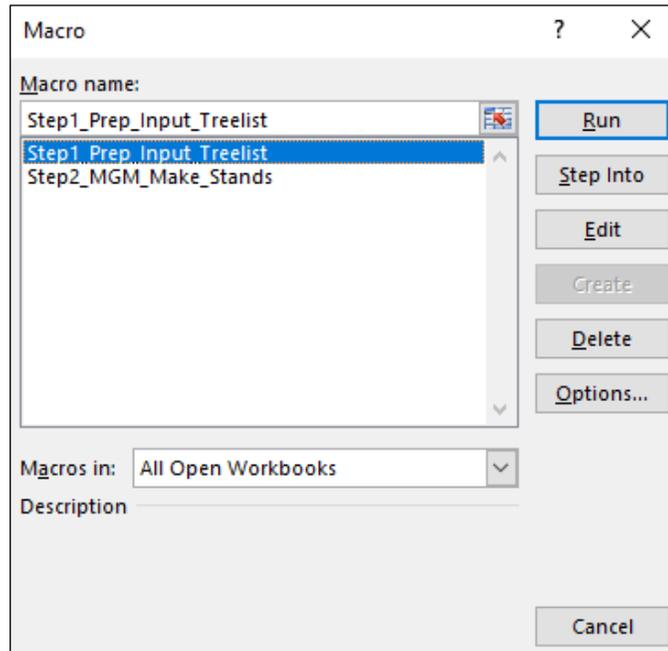

Figure 11.1. Macro dialog.

12. If the "Step1_Prep_Input_Treelist" macro is successful, a "Preparation of Input Treelist Complete" message will appear (Figure 12.1).
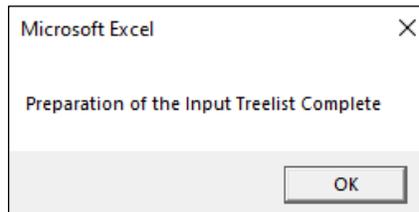

Figure 12.1. Preparation of the Input Treelist Complete message.

13. If errors are encountered, the following message will appear (Figure 13.1). Errors are listed by MGM_PlotID, trNum, and error type in the "Input_Treelist_Error_Log" worksheet. These errors are also highlighted in the "Prepared_Input_Treelist" worksheet.
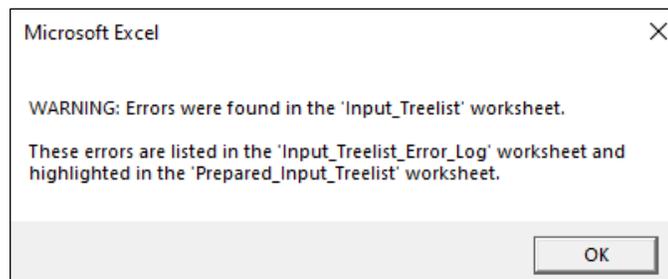

Figure 13.1. Error message.

12/16/2021

14. In the "Prepared_Input_Treelist" worksheet, critical errors are highlighted in red, and items for review are highlighted in yellow.
    a. Critical errors (highlighted in red) violate the treelist formatting rules outlined in Step 7a. Common errors include:
        i. Treelist variables that contain extra, unseen spaces.
        ii. Trees ≤ 1.3m tall without a "-1" placeholder in the trDbh column.
        iii. Trees ≤ 1.3m tall without a "-1" placeholder in the trBHAge column.
        iv. Trees > 1.3m tall with a "-1" placeholder in the trDbh column.
        v. Trees with blank or nonnumeric trAge or trBHAge values.
        vi. Tree species without an associated site index value.
            o White spruce, Engelmann spruce, hybrid spruce, balsam fir, subalpine fir, or Douglas-fir require a Sw_BH_SI value.
            o Pine require a P_BH_SI value.
            o Hardwood species require an Aw_BH_SI value.
            o Black spruce and tamarack require a Sb_BH_SI value.
    b. Items for review (highlighted in yellow) will not stop MGM projections but may need special attention:
        i. Trees with unusual slenderness characteristics [Trees > 1.3m where (trHt / trDbh) < 0.5. Trees > 3.0m where (trHt / trDbh) > 3.]
            o Primary data and/or defect information should be reviewed on these trees.
            o Unusual slenderness may be caused by data entry errors (e.g. Height and DBH decimal points may be in the wrong place. Height and DBH may be entered into the wrong columns. Height was not recorded in metres, or DBH was not recorded in centimetres.).
            o Data entry errors should be corrected.
            o Unusually low slenderness may be caused by severe breakage, severe lean, windthrow, or snowpress.
            o In some cases, it may be advisable to remove trees with severe defects (e.g. trees lying on the ground, mature poplar broken at 2m with a few live branches). However, any tree-level removals should be explicitly documented and/or follow provincial forest management planning protocols.
            o Some trees with unusual slenderness may have no data errors or severe defects. Unusual slenderness values may occur on healthy veteran trees or healthy trees in controlled density experiments. These trees should be retained "as is".
15. Correct the errors in the "Input_Treelist" worksheet (i.e. your original dataset).
16. Run "Step1_Prep_Input_Treelist" again (Figure 11.1). All critical errors (highlighted in red) should disappear from the "Input_Treelist_Error_Log" and "Prepared_Input_Treelist" worksheets. Items for review (highlighted in yellow) that can be corrected should disappear from the "Input_Treelist_Error_Log" and "Prepared_Input_Treelist" worksheets.
17. Run the macro "Step2_MGM_Make_Stands". This macro creates MGM Stand Worksheets from the "Prepared_Input_Treelist" worksheet.
18. After the macro completes, go to "File", "Save As", and save the "MGM21_Make_Stands_v2_1.xlsm" workbook in your MGM Working Directory (e.g. "C:\Users\YourProfile\Desktop\MGM21").
    a. The "MGM21_Make_Stands_v2_1.xlsm" workbook should be renamed (e.g. "My_Agency_MGM_Stands") to avoid confusion when working with multiple datasets.
    b. The Make Stands workbook may be saved as a macro-free ".xlsx" file.
    c. The "Example_Data", "Input_Treelist", and "Prepared_Input_Treelist" worksheets may be deleted, if desired.
19. Open "MGM – My Working Copy", go to the "MGM" tab, and click "Set Workbook Names". In the new dialog, set the "Stands Workbook Name" to the new MGM Stands workbook (e.g. My_Agency_MGM_Stands.xlsx). Click "OK" to exit the dialog.
20. Create a new Crop Plan. Then, update this Crop Plan to reference the new MGM Stands workbook. To do this, right-click on the "Options" event, and click "Edit CP Event". If a warning message appears, click "Yes" to make the new Crop Plan use the Stands Workbook in "Set Workbook Names". The "MGM -- Options" dialog will appear. Select the Region (tab) and SubRegion (dropdown) for the Stand Worksheet that you will grow. Click "OK" to exit the "MGM -- Options" dialog.
21. Update the "Establish" event to reference a specific Stand Worksheet. To do this, right-click on the "Establish" event, and click "Edit CP Event". If a warning message appears, click "OK" to dismiss the message. The "Establish/Regenerate Stand" dialog will appear. Select the "Read Trees (XLSX)" tab, and choose the Stand Worksheet that you will grow. Click "OK". Note: It is important to complete both Steps 18 and 19.
22. Run your updated Crop Plan. It should run successfully. Save "MGM – My Working Copy".

References

Archibald, J.H., G.D. Klappstein, and I.G.W. Corns. 1996. Field Guide to the Ecosites of Southwestern Alberta. Natural Resources Canada, Canadian Forest Service, Northwest Region, Northern Forestry Centre, Edmonton, AB. Special Report 8.

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